

LECTURE 27
POTATO
Solanum tuberosum

Family: Solanaceae

Origin

The probable centre of origin of potato is in South America in the central Andean region. Evidence indicates that potatoes were cultivated for centuries by South American Indians and the tubers were used as a common article of food.

Varieties/Hybrids

Kufri Alankar

It is a derivatives of the cross (Kennebee x O.N .2090) x (Majestic x Ekishiraju), released in 1968 by Central Variety Release Committee for plains of Punjab, Haryana and Western Uttar Pradesh and specially suited for sandy soils.

Kufri Anand

A derivative of PJ376 x PH/F 1430, released from CPRI, Shimla in 1999. **KUFRI**

Ashoka

It is a wider adaptable variety released from CPIU, Shimla in 1996. It is a derivative of (EM/C-I 020 x Allerfi'uii lleste Gelbe).

Kufri Badshah

It is a cross of Kufri Jyoti and Kufri Alankar and released in 1980 by Central Sub Committee on release in varieties for Indo - gangetic plains of North India, including Punjab, Haryana, Uttar Pradesh, Bihar, West Bengal, Madhya Pradesh and Plateau region. **Kufri**

Bahar

It is a derivative of the cross Kufri Red x Ginek and released by :! Central Sub-Committee on Release of Varieties in 1980 for the plains of Haryana, Punjab and Western Uttar Pradesh.

Kufri Chamatkar

A derivative of the cross *Ekishiraju* x *Phulwa* and released in 1967 by Central Variety Released Committee for the plains 01 Uttar Pradesh, Madhya Pradesh, Haryana, Punjab, where one crop of long duration is raised.

Kufri Chandramukhi

It is a derivative of the cross S.4485 X Kufri Kuber and released in 1967 in Central Variety Release Committee for the plains of Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, West Bengal and Maharashtra.

Kufri Chipsona-L

It is a cross of MEX.750826 x MS/78- 79 and released from CPRI, Shimla in 1998.

Kufri Chipsona-2

It is a derivative of F-6 x QB/B-92-4 and released from CPRI, Shimla in 1998.

Kufri Dewa

It is a derivative of the cross Craigs Defiance x Phulwa and released by Central Sub-Committee on Release of Varieties in-1973 for Tarai area of Uttranchal and Shimla agroclimatic conditions. It is also suitable for Bihar and Orissa.

Kufri Giriraj

It is north and south India adaptable variety. It is a cross of SLB/1-132 x EX/A 680-16 and released from CPRI, Shimla in 1998.

Kufri Himalini

It is a derivative of cross SLB/H-140 x SLB/Z-389 (b) Recommended by 9th workshop of the All India Coordinated Potato Improvement Project for Hilly regions (hills of Northern India and Nilgiris in South) in the country.

Kufri Jawahar

It is a derivative of Kufri Neelamani x Kufri Tyoti and released from Central Potato Research Institute, Shimla in 1996.

Kufri Jeevan

It is a derivative of the cross M-I09-3 x D 698 and adopted for northwest hills of Himachal Pradesh and Uttar Pradesh.

Kufri Jyoti

It is a derivative of the cross 3069d(4) x 2814 Q (1) and released in 1968 by the Central Variety Release Committee for Himachal Pradesh and Kumaon Hills of Uttranchal and also plains where late blight is a limiting factor.

Kufriu Khashigaro

It is popular variety of hilly region and a derivative of the cross Taborky x SD 698 D.It is adapted to hilly regions of Assam.

Kufri Lali.Ma

It is a fast bulking variety and a derivative of the cross Kufri Red x CP 1362, which released in 1982 by Central Sub-Committee on Release of Varieties for the plains of Uttar Pradesh, Bihar, West Bengal, Orissa and Karnataka States.

Kufri Lauvkai

It is a derivative of cross Serkoy x Adina released in 1973 by Central sub-committee on Release of Varieties for Decan Peninsula (Maharashtra).

Kufri Muthu

It is a derivative of the cross 3046(1) x M-109-C and released in 1971 by Central Sub Committee on release of Varieties for Nilgiri Hills for summer and autumn seasons. **KUFRI Naveen**

It is a derivative of the cross 0-692 x, 3070d (4) and adapted to northeast hills of Assam and high altitude of Himachal Pradesh.

Kufri Pukhraj

It is a wider adaptable variety and a cross of Craig's Defiance x JEX/B-687, which released in 1998 from CPRI, Shimla.

Kufri Sheetman

It is a derivative of the cross Craig Defiance x Phulwa, released in 1968 by Central Variety Release Committee for plains, especially frost affected areas of Punjab, Rajasthan, Haryana and Western Uttar Pradesh.

Kufri Sherpa

It is a derivative of the cross Ultimus x Adina and recommended for cultivation in the hills to West Bengal State by 9th Workshop of All India Coordinated Potato Improvement Project.

Kufri Sindhuri

It is derivative of the cross Kufri Kundan x Kufri Red and released by Central Variety Release Committee in 1966 for plains of Punjab, Jammu, Orisa, Bihar, Haryana, Uttar Pradesh, Madhya Pradesh and West Bengal.

Kufri Sutlej

It is a derivative of Kufri Bahar x Kufri Alankar and released in 1996 from CPRI, Shimla.

Kufri Swarna

It is a cross of Kufri Jyoti x (VIn) 2 (62.33.3) and released in tile year of 1985 from CPRI, Shimla.

Climatic Requirements

Potato is basically cool season crop. It grows well from sea level to snow line, where sufficient moisture and fertile soil are available. It is grown in winter in plains of India. However, in northern hills, it is grown as summer season crop. Potato is a long day plant but cultivated as short day plant. It requires favourable environmental conditions such as low temperature and short day conditions at the time of tuberization for rapid bulking rate. About 20 °C temperature is good for tuber formation and it reduces as the temperature increases. Tuberization is badly affected at about 30°C temperature. At higher temperature, the respiration rate increases and the carbohydrates produced by photosynthesis are consumed rather than stored in tuber. High temperatures at any part of growing period affect the size of leaflets, thereby reducing the tuber formation. It grows best under long day conditions sunshine along with cooler nights are essential for reducing the spread of diseases.

Soil Conditions

Potato can be produced on a wide range of soils, ranging from sandy loam, silt loam, loam and clay soil. Soil for potato should be friable, well aerated, fairly deep and well supplied with organic matter. Well- drained sandy loam and medium loam soils are most suitable for potato cultivation. Soil structure and texture has a marked effect on the quality of the tuber. Light soil is preferred, because they tend to promote more uniform soil temperatures and make harvesting of the crop easier. Alkaline or saline soil is not suitable for potato cultivation. They are well suited to acidic soils (pH 5.0 to 6.5) as acidic conditions tend to limit scab diseases.

Planting Time

I. In Plains

Early Crop: Third week of September to first week of October.

Main crop: First week of October to third week of October.

Late Crop: Third week of October to first week of November

II. In Hills

Potato is planted in hills from the third week of February to second week of April. In the southern hills near Ootacamund and in Nilgiris, planting is done three times in a year, i.e. in the month of February, April and September. In the plateau regions of Maharashtra, Bihar Madhya Pradesh, potato is raised in rainy and winter seasons.. In the Mysore plateau, the summer and winter crop is planted in April-June and in October-December, respectively.

Seed Rate, Methods of Sowing and Spacing

The seed requirements for a hectare on the basis of seed size are given below:

Large size- 25-30 q/ha; Medium size- 15-20 q/ha; Small size- 10-15 q/ha; Out tubers- 8-12 q/h²:-' Potato is planted mainly by two methods:

1. Ridge and Furrow Method:

In this method, the ridges are prepared. The length of the ridges depends on slope of the plot. Too long ridges and furrows are not supplied with irrigation water conveniently. The potato tubers are planted on is let into furrows.

2. Flat Bed Method

In this method, the whole plot is divided into beds of convenient length and width. The shallow furrows are opened and potato tubers are planted at recommended distance. The tubers are covered with the original soil of furrows. When the germination is completed and plants become 10 to 12 cm height, earthing should be done. Suitable plant spacing in relation to potato seed grades are given below:

Diameter of tuber from longer axis	Planting distance (row x seed)
2.5-3.5 cm	50 x 20 cm or 60 x 15 cm
3.5-5.0 cm	60 x 25 cm
5.0-6.0 cm	60 x 40 cm

Nutritional requirements and their management:

Soils poor in organic matter content should be supplied with 250 to 500 q/ha of farmyard manure or compost during land preparation, preferably a fortnight before planting. Potato plant is a heavy feeder. When it is grown in medium type of soils, it needs 100 to 150 kg nitrogen, 80 to 100 kg phosphorous and 80 to 100 kg potassium per hectare. Two - third to three fourth quantity of nitrogen along with whole quantity of phosphorus and potassium is applied at the time of planting. Remaining one fourth to one third nitrogen is applied 30 to 35 days after planting i.e. at the time of first earthing up or when plants become 25 to 30 cm in height either in the form of top dressing or as a foliar feeding. Spraying of essential micronutrients such as boron, zinc, copper, iron, manganese, molybdenum etc. is done when crop is showing deficiency symptoms.

Intercultural Operations

In potato crop, both types of weeds are found i.e. broad-leaved weeds as well as narrow leaved weeds-The use of weedicides in potato crop in general is not essential because earthing up operation destroy almost all weeds, if some how, weed plants are growing on ridges, they may be pulled out by hands. Pre- emergence application of nitrofen @ 1.0 kg a.i./ha or alachlor

@.2.0 kg a.i./ha or post emergence application of propanil @ 1.0 kg a.i./ha may be used in solution form (800-1000 litre/ha). Care should be taken while spraying of post-emergence herbicides that they should not come in contact with potato plants. Proper development of tubers depends upon aeration, moisture availability and proper soil temperature. Therefore, proper earthing up is necessary. Earthing should be done when the plants are 15 to 22 cm in height. Generally earthing is done at the time of top dressing of nitrogenous fertilizers. The ridges should be high enough to cover up tubers. If necessary, a second earthing may be done after two weeks of the first one. A mould board plough or a ridger may be used for earthing up in large areas.

Use of Plant Growth Regulators

Soaking of potato seed tuber in CCC at 500 mg/l (Schedule and Pandita, 1986), sodium ascorbate at 100 mg/l (Murti et al., 1975) cytozyme at 5 per cent (Pandita and Hooda, 1979), Singh and Kaur, 1981) or foliar sprays with ethephon at 400 mg/l (Murti and Banerjee, 1978, Pandita and Hooda, 1979 a, Sekhon and Singh, 1985), CCC at 25 mg/l or garlic acid at 10-100 mg/l (Kumar and Agarwal, 1978) increased tuber yield. Sidda Reddy (1988) also obtained higher tuber yield with foliar sprays of mixtallol at 1 or 2 mg/l.

Water Management

Before coming to the planting operation, it should be kept in mind that sufficient soil moisture is available for satisfactory sprouting. If not then light pre-irrigation or just after planting may be given. The rate of water use is low till 30-35 days after planting; it means that the first irrigation is essentially done within 30-35 days after planting. However, when soil moisture seems insufficient for sprouting, intervals of first irrigation should be reduced. Further, irrigation is done as and when crop needs. As regards method of irrigation in potato, the furrow method is commonly followed.

Harvesting, Yield and Storage

Harvested potatoes are heaped under shade for a couple of days, so that their skin becomes hard and soil adhering with them is also separated out. Under good crop management, 350-450 quintals of marketable potatoes of good quality can be produced from one hectare land. The sorting operation is the most important, in that all cut tubers, bruised, injured by insects-pest and disease are removed. Sorted healthy tubers are graded into different grades based on diameter of the tubers to reduce the prices in the market. Therefore, such tubers should be sorted and marked separately. Over sized tubers are great in demand for chips making. Very small sized tubers are also not remaining unsold. These tubers are

purchased by poor people for making vegetable by partially Cushing them before cooking. However, both the over sized and under sized are quite unsuitable for seed purposes. Potatoes can be stored in the cold storage at the temperatures of 4 to 7°C and relative humidity.

Multiple choice questions

1. Maximum acreage under Potato is in the state
a. West bengal b. Tamil Nadu **c. U.P**
2. The centre of origin of Potato is _____
a. **Peru & Bolivia** b. Russia c. S.Africa
3. Best season for potato cultivation _____
a. *Kharif* b. Summer **c. Rabi**
4. Soil suitable for potato cultivation is _____
a. Clay b. Clay loam **c. Sandy loam**
5. Optimum temperature for tuberization of Potato _____
a. 17 -20⁰c b. 10 – 15⁰c c. 20 – 25⁰c
6. Most common herbicide used for weed control in Potato is _____
a. Pendimethalin **b. Alachlor** c. Oxyflurofen